

Grigory Solomatov

Applied mathematician · computational imaging & algorithms · scientific & product software

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Profile

Applied mathematician and scientific software developer with a PhD and professional experience in research and product software. My work spans fast algorithms, coding theory, computer algebra, inverse problems, and computational imaging. Recent imaging research addresses color recovery and optical-property estimation in scattering media, including underwater applications.

Experience

- 2023–2026 **Postdoctoral researcher** | University of Haifa
- Developed mathematical models and Python research software for underwater color recovery, image restoration, and optical-property estimation in scattering media.
 - Developed a camera spectral-sensitivity method using public calibration data and an autoencoder trained on measured sensitivity curves. The project released code, a citable dataset, and predicted sensitivities for more than 1,000 camera models.
- 2022 **Postdoctoral researcher** | Tel Aviv University
- Investigated neural networks using methods from coding theory.
- 2021 **Research assistant** | Technical University of Denmark
- Developed computer-algebra methods and software for algebraic-geometry codes.
- 2017–2018 **Software developer** | RailCOMPLETE
- Built C# modeling software for railway engineers, implementing product features from domain requirements in a Scrum team with code review.
- 2015–2016 **Software developer intern** | Schlumberger
- Developed and tested C++ modeling tools for geoscientists in a code-review workflow.

Selected contributions

- Underwater imaging** Developed theoretical conditions for bounded uncertainty in color recovery. In an idealized follow-up model, the uncertainty approaches zero as image resolution increases and the scene provides sufficient depth variation.
- Camera response** Developed a method using public calibration matrices and an autoencoder trained on 51 measured sensitivity functions. Evaluated it with leave-one-out validation; the project released predictions for more than 1,000 camera models.
- Fast algorithms** Developed algorithms for algebraic-geometry codes, polynomial-matrix normal forms, and bivariate evaluation and interpolation, with proved complexity bounds and improvements over prior asymptotic results.

Skills

- Mathematics and algorithms** inverse problems, numerical optimization, approximation theory, fast exact algorithms, coding theory, computer algebra, complexity analysis
- Imaging and sensing** computational imaging, underwater color recovery, optical properties, camera spectral sensitivity, image restoration
- Programming languages** Python, C#, C++, JavaScript, Rust, Lisp, MATLAB, Bash, SQL
- Libraries and runtimes** NumPy, SciPy, Pandas, PyTorch, OpenCV, scikit-learn, SageMath; Node.js, Socket.IO, React
- Engineering practice** automated testing, code review, debugging, Scrum, Git, Linux, Docker, reproducible computational workflows
- Student supervision** bachelor's, master's, and PhD students

Publications and research outputs

Computational imaging and color science

1. Grigory Solomatov, Derya Akkaynak. **Underwater Color Restoration with Vanishing Uncertainty.** arXiv:2608.15598, 2026.
2. Grigory Solomatov, Derya Akkaynak. **Conditions for well-posed color recovery in scattering media.** arXiv:2605.03837, 2026.
3. Grigory Solomatov, Derya Akkaynak. **Spectral Sensitivity Estimation Without a Camera.** IEEE International Conference on Computational Photography (ICCP), 2023, pp. 1–12. [10.1109/ICCP56744.2023.10233713](https://doi.org/10.1109/ICCP56744.2023.10233713). Associated camera dataset: [10.5281/zenodo.8314701](https://doi.org/10.5281/zenodo.8314701).

Algorithms, coding theory, and computer algebra

4. Peter Beelen, Johan Rosenkilde, Grigory Solomatov. **Fast Decoding of AG Codes.** IEEE Transactions on Information Theory 68(11), 2022, pp. 7215–7232. [10.1109/TIT.2022.3188843](https://doi.org/10.1109/TIT.2022.3188843).
5. Sven Puchinger, Johan Rosenkilde, Grigory Solomatov. **Improved Power Decoding of Algebraic Geometry Codes.** IEEE International Symposium on Information Theory (ISIT), 2021, pp. 509–514. [10.1109/ISIT45174.2021.9517938](https://doi.org/10.1109/ISIT45174.2021.9517938).
6. Peter Beelen, Johan Rosenkilde, Grigory Solomatov. **Fast Encoding of AG Codes Over C_{ab} Curves.** IEEE Transactions on Information Theory 67(3), 2021, pp. 1641–1655. [10.1109/TIT.2020.3042248](https://doi.org/10.1109/TIT.2020.3042248).
7. Vincent Neiger, Johan Rosenkilde, Grigory Solomatov. **Generic bivariate multi-point evaluation, interpolation and modular composition with precomputation.** ISSAC 2020, pp. 388–395. [10.1145/3373207.3404032](https://doi.org/10.1145/3373207.3404032).
8. Vincent Neiger, Johan Rosenkilde, Grigory Solomatov. **Computing Popov and Hermite Forms of Rectangular Polynomial Matrices.** ISSAC 2018, pp. 295–302. [10.1145/3208976.3208988](https://doi.org/10.1145/3208976.3208988).

Invited talks and lectures

Imaging and sensing

- **Focal speaker.** “Is Accurate Color Recovery in Underwater Images Even Possible?” London Imaging Meeting, London, June 2026.
- **Summer School lecture.** “Underwater Color Theory,” London Imaging Meeting, London, June 2026.
- **Early Career Spotlight.** ICRA workshop *From Sea to Space: Advancing Perception in Harsh Domains*, Vienna, June 2026.
- **Keynote.** “Estimating Optical Properties of Water from RGBD Data,” Joint Workshop on Marine Vision, ICCV, Honolulu, October 2025.

Algorithms and coding theory

- **Invited seminar.** “Fast List Decoding of Algebraic Geometry Codes,” INRIA–École Polytechnique GRACE seminar, March 2022.
- **Invited seminar.** “Computational Aspects of Algebraic Geometry Codes,” INRIA–École Polytechnique GRACE seminar, February 2022.

Education

PhD, Applied Mathematics	Technical University of Denmark	2018–2021
MSc, Applied Mathematics	Technical University of Denmark	2016–2017
BSc, Physics and Mathematics	NTNU	2012–2016

Languages

English, Norwegian, and Russian (fluent).